

AMENDMENTS TO THE CLAIMS

1 1. (Currently Amended) A method of using a computer system to
2 consolidate multiple configuration models of a product, the method comprising:
3 identifying a conflict between at least two of the configuration models, wherein
4 the configuration models are organized in accordance with respective
5 directed acyclic graphs, each configuration model includes at least one
6 ancestor configuration model family space and a child configuration
7 model family space below the ancestor configuration model family space,
8 a first of the conflicting configuration models comprises an ancestor
9 configuration model family space that is different than an ancestor
10 configuration model family space of a second of the conflicting
11 configuration model, and each child configuration model family space
12 constrains the ancestor configuration model family space above the child
13 in accordance with configuration rules of the configuration model to
14 which the child belongs;
15 extending at least one of the ancestor configuration model family spaces of the
16 conflicting configuration models so that the ancestor configuration model
17 family spaces of the first and second conflicting configuration models
18 represent the same ancestor configuration model family space;
19 removing from the child configuration model family space any configuration
20 space extended in the ancestor of the child configuration family space; and
21 combining the first and second configuration models into a single, consolidated
22 model that maintains a non-cyclic chain of dependencies among families
23 and features of families for use in answering configuration questions
24 related to the product.

1 2. (Original) The method of claim 1 further comprising:
2 detecting any inconsistencies between rules included in the consolidated model;
3 and

4 attempting to resolve any detected inconsistencies.

1 3. (Currently Amended) A computer system configured for consolidating
2 multiple configuration models of a product, the system comprising:
3 a processor; and
4 a memory, coupled to the processor, having code stored therein and executable by
5 the processor for:
6 identifying a conflict between at least two of the configuration models,
7 wherein the configuration models are organized in accordance with
8 respective directed acyclic graphs, each configuration model
9 includes at least one ancestor configuration model family space
10 and a child configuration model family space below the ancestor
11 configuration model family space, a first of the conflicting
12 configuration models comprises an ancestor configuration model
13 family space that is different than an ancestor configuration model
14 family space of a second of the conflicting configuration model,
15 and each child configuration model family space constrains the
16 ancestor configuration model family space above the child in
17 accordance with configuration rules of the configuration model to
18 which the child belongs;
19 extending at least one of the ancestor configuration model family spaces
20 of the conflicting configuration models so that the ancestor
21 configuration model family spaces of the first and second
22 conflicting configuration models represent the same ancestor
23 configuration model family space;
24 removing from the child configuration model family space any
25 configuration space extended in the ancestor of the child
26 configuration family space; and
27 combining the first and second configuration models into a single,
28 consolidated model that maintains a non-cyclic chain of

29 dependencies among families and features of families for use in
30 answering configuration questions related to the product.

1 4. (Currently Amended) A computer readable medium having instructions
2 encoded therein and executable by a processor to consolidate multiple configuration
3 models of a product, the instructions comprising code for:
4 identifying a conflict between at least two of the configuration models, wherein
5 the configuration models are organized in accordance with respective
6 directed acyclic graphs, each configuration model includes at least one
7 ancestor configuration model family space and a child configuration
8 model family space below the ancestor configuration model family space,
9 a first of the conflicting configuration models comprises an ancestor
10 configuration model family space that is different than an ancestor
11 configuration model family space of a second of the conflicting
12 configuration model, and each child configuration model family space
13 constrains the ancestor configuration model family space above the child
14 in accordance with configuration rules of the configuration model to
15 which the child belongs;
16 extending at least one of the ancestor configuration model family spaces of the
17 conflicting configuration models so that the ancestor configuration model
18 family spaces of the first and second conflicting configuration models
19 represent the same ancestor configuration model family space;
20 removing from the child configuration model family space any configuration
21 space extended in the ancestor of the child configuration family space; and
22 combining the first and second configuration models into a single, consolidated
23 model that maintains a non-cyclic chain of dependencies among families
24 and features of families for use in answering configuration questions
25 related to the product.

1 5. (Previously Presented) The method of claim 1 wherein the
2 configuration models represent configuration models of vehicles.

1 6. (Previously Presented) The method of claim 1 wherein the
2 consolidated model includes only buildable configurations.

1 7. (Previously Presented) The method of claim 1 wherein:
2 extending at least one of the ancestor configuration model family spaces of the
3 conflicting configuration models so that the ancestor configuration model
4 family spaces of the first and second conflicting configuration models
5 represent the same ancestor configuration model family further comprises:
6 extending a rule from the first configuration model into the ancestor
7 configuration model family space; and
8 removing from the child configuration model family space any configuration
9 space extended in the ancestor of the child configuration family space
10 further comprises:
11 repairing the extension of the rule in the child family.

1 8. (Previously Presented) The method of claim 1 wherein combining the
2 first and second models into a single, consolidated model further comprises:
3 loading the configuration models into a memory of the computer system;
4 constructing a directed acyclic graph of all rules in all the configuration models;
5 for each configuration model, determining which portions of an overall
6 configuration space for which the configuration model does not provide a
7 buildable configuration; and
8 for each configuration model, constraining statements of the rules within the
9 configuration model to fall within a space of defining features of the
10 configuration model.

1 9. (Previously Presented) The method of claim 8 wherein determining which
2 portions of an overall configuration space for which each configuration model does not
3 provide a buildable configuration further comprises:
4 determining which families are ancestors of families of defining constraints; and

5 subtracting a right hand side and a left hand side of each rule of each family that
6 are ancestors of families of defining constraints from a rule representing
7 all buildable configurations.

1 10. (Previously Presented) The system of claim 3 further comprising code
2 for:
3 detecting any inconsistencies between rules included in the consolidated model;
4 and
5 attempting to resolve any detected inconsistencies.

1 11. (Previously Presented) The system of claim 3 wherein the
2 configuration models represent configuration models of vehicles.

1 12. (Previously Presented) The system of claim 3 wherein the
2 consolidated model includes only buildable configurations.

1 13. (Previously Presented) The system of claim 3 wherein:
2 the code for extending at least one of the ancestor configuration model family
3 spaces of the conflicting configuration models so that the ancestor
4 configuration model family spaces of the first and second conflicting
5 configuration models represent the same ancestor configuration model
6 family space comprises code for extending a rule from the first conflicting
7 configuration model into the ancestor family; and
8 the code for removing from the child configuration model family space any
9 configuration space extended in the ancestor of the child configuration
10 family space comprises code for repairing the extension of the rule in the
11 child family.

1 14. (Previously Presented) The system of claim 3 the code for combining the
2 first and second models into a single, consolidated model further comprises code for:
3 loading the configuration models into a memory of the computer system;
4 constructing a directed acyclic graph of all rules in all the configuration models;

5 for each configuration model, determining which portions of an overall
6 configuration space for which the configuration model does not provide a
7 buildable configuration; and
8 for each configuration model, constraining statements of the rules within the
9 configuration model to fall within a space of defining features of the
10 configuration model.

1 15. (Previously Presented) The system of claim 14 wherein the code for
2 determining which portions of an overall configuration space for which the configuration
3 model does not provide a buildable configuration further comprises code for:
4 determining which families are ancestors of families of defining constraints; and
5 subtracting a right hand side and a left hand side of each rule of each family that
6 are ancestors of families of defining constraints from a rule representing
7 all buildable configurations.

1 16. (Previously Presented) The computer readable medium of claim 4 further
2 comprising code for:
3 detecting any inconsistencies between rules included in the consolidated model;
4 and
5 attempting to resolve any detected inconsistencies.

1 17. (Previously Presented) The computer readable medium of claim 4
2 wherein the models represent configuration models of vehicles.

1 18. (Previously Presented) The computer readable medium of claim 4
2 wherein the configuration models represent configuration models of vehicles.

1 19. (Previously Presented) The computer readable medium of claim 4
2 wherein:
3 the code for extending at least one of the ancestor configuration model family
4 spaces of the conflicting configuration models so that the ancestor
5 configuration model family spaces of the first and second conflicting

configuration models represent the same ancestor configuration model
family space comprises code for extending a rule from the first conflicting
configuration model into the ancestor family; and
the code for removing from the child configuration model family space any
configuration space extended in the ancestor of the child configuration
family space comprises code for repairing the extension of the rule in the
child family.

20. (Previously Presented) The computer readable medium of claim 4 the
code for combining the first and second models into a single, consolidated model further
comprises code for:
loading the configuration models into a memory of the computer system;
constructing a directed acyclic graph of all rules in all the configuration models;
for each configuration model, determining which portions of an overall
configuration space for which the configuration model does not provide a
buildable configuration; and
for each configuration model, constraining statements of the rules within the
configuration model to fall within a space of defining features of the
configuration model.

21. (Previously Presented) The computer readable medium of claim 20
wherein the code for determining which portions of an overall configuration space for
which the configuration model does not provide a buildable configuration further
comprises code for:
determining which families are ancestors of families of defining constraints; and
subtracting a right hand side and a left hand side of each rule of each family that
are ancestors of families of defining constraints from a rule representing
all buildable configurations.

22. (Currently Amended) A computer system for performing an automatic consolidation of multiple configuration models of a configurable ~~products~~ product, the system comprising:

means for identifying a conflict between at least two of the configuration models, wherein the configuration models are organized in accordance with respective directed acyclic graphs, each configuration model includes at least one ancestor configuration model family space and a child configuration model family space below the ancestor configuration model family space, a first of the conflicting configuration models comprises an ancestor configuration model family space that is different than an ancestor configuration model family space of a second of the conflicting configuration model, and each child configuration model family space constrains the ancestor configuration model family space above the child in accordance with configuration rules of the configuration model to which the child belongs;

means for extending at least one of the ancestor configuration model family spaces of the conflicting configuration models so that the ancestor configuration model family spaces of the first and second conflicting configuration models represent the same ancestor configuration model family space;

means for removing from the child configuration model family space any configuration space extended in the ancestor of the child configuration family space; and

means for combining the first and second configuration models into a single, consolidated model that maintains a non-cyclic chain of dependencies among families and features of families for use in providing an answer to configuration questions related to the product.